FACT SHEET FOR AQUATIC MOSQUITO CONTROL GENERAL NPDES PERMIT

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SUMMARY

The state of Washington Department of Ecology (department) has tentatively determined to issue a general permit for the application of insecticides to control mosquitoes in surface waters of the state of Washington. The use of insecticides is subject to the provisions of integrated pest management plans (IPMs). Monitoring is required in certain situations. Any short term toxicity to aquatic organisms is allowed under the terms of the permit and the water quality modification provisions to perform essential activities that protect public health. The proposed terms, limitations and conditions contained herein are tentative and may be subject to change, subsequent to public comments and testimony provided at public hearings. All facilities accepted under the general permit will not be relieved of any responsibility or liability at any time during the life of the permit for: (1) violating or exceeding state water quality standards; or (2) violating any other local, state, or federal regulation or standard as may pertain to the individual facility. Activities not accepted under the general permit may be required to apply for an individual permit. Any application of insecticide to surface waters of the state requiring NPDES permit coverage found not covered under either the general permit or an individual permit will be considered to be operating without a discharge permit and subject to potential enforcement action.

On March 12, 2001, the Ninth Circuit Court of Appeals decided that the application of an herbicide in compliance with the labeling requirements of Federal Insecticide Fungicide Rodenticide Act (FIFRA) did not exempt an irrigation district from needing an NPDES permit (*Headwaters, Inc. v. Talent Irrigation District*). Ecology, as had many more states, had been issuing orders that were not NPDES permits that placed protective conditions on the use of pesticides in waters of the state. This general permit will replace those short term modifications where pesticide applications are directed into surface waters of the state for the purpose of controlling mosquitoes.

INTRODUCTION

This fact sheet is a companion document that provides the basis for issuance of the Aquatic Mosquito Control National Pollutant Discharge Elimination System (NPDES) General Permit. The Department of Ecology (the department) is proposing to issue this permit, which will allow discharge of wastes from aquatic insecticide applications and from nonchemical methods to control mosquitoes in surface waters of the state of Washington, which are also waters of the United States, pursuant to the provisions of chapters 90.48, 90.52, and 90.54 Revised Code of Washington (RCW) and the Federal Water Pollution Control Act (FWPCA) as amended. This

fact sheet explains the nature of the proposed discharges, the department's decisions on limiting the pollutants in the wastewater, and the regulatory and technical basis for these decisions.

The Federal Clean Water Act (FCWA, 1972), and later modifications (1977, 1981, and 1987), established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the state of Washington on the basis of Chapter 90.48 RCW, which defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The establishment of a general permit for Aquatic Mosquito Control is appropriate due to the similar environmental fate specific to each permitted herbicide, the uniform discharge conditions to which all applications would be subject, the statewide scope of aquatic mosquito control, and the significant reduction of resources necessary for permit handling. However, individual permits will still be considered in those instances where a proposed activity requires more detailed guidance, or when an individual applicator so desires and the department approves.

The regulations adopted by the state include procedures for issuing general permits (Chapter 173-226 WAC), water quality criteria for surface waters (Chapters 173-201A WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastes to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-226-110) for issuing a general permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the draft permit, public hearings, comment periods, and public notice of issuance are all required before the general permit is issued (WAC 173-226-130).

The fact sheet and draft permit have been reviewed by representatives of the potential permittees and other members of a permit advisory group. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the department's response. The original fact sheet will not be revised after the public notice is published. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.


Larvaciding with diesel oil

BACKGROUND INFORMATION

A March 12, 2001 decision by the Ninth Circuit Court in *Headwaters, Inc. v. Talent Irrigation District* found that the applicator should have obtained coverage under a National Pollutant Discharge Elimination System (NPDES) permit prior to application of aquatic pesticides to an irrigation canal in Oregon. The canal discharged water into a creek where a fish kill occurred. The decision addressed residues and other products of aquatic pesticides.

Headwaters, Inc. and Oregon Natural Resources Council filed a Clean Water Act citizen suit against the Talent Irrigation District (TID) for applying aquatic herbicide into a system of irrigation canals. Reversing a district court's opinion, the Ninth Circuit held that application of the pesticide in compliance with the labeling requirements of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) did not exempt TID from having to obtain a NPDES permit, and that the irrigation ditches were "waters of the United States" under the Clean Water Act.

The Federal Insecticide, Fungicide, and Rodenticide Act of 1979 (FIFRA), as administered by the United States Environmental Protection Agency (EPA), requires that all persons who apply pesticides classified as restricted use be certified according to the provisions of the act or that they work under the supervision of a certified applicator. Commercial and public applicators must demonstrate a practical knowledge of the principles and practices of pest control and safe use of pesticides, which will be accomplished by means of a "core" examination. In addition, applicators using or supervising the use of any restricted use pesticides purposefully applied to standing or running water (excluding applicators engaged in public health related activities) are required to pass an additional exam to demonstrate competency as described in the code of federal regulations as follows:

> "Aquatic applicators shall demonstrate practical knowledge of the secondary effects which can be caused by improper application rates, incorrect formulations, and faulty application of restricted pesticides used in this category. They shall demonstrate practical knowledge of various water use situations and the potential of downstream effects. Further, they must have

practical knowledge concerning potential pesticide effects on plants, fish, birds, beneficial insects and other organisms which may be present in aquatic environments. Applicants in this category must demonstrate practical knowledge of the principles of limited area application." (40 CFR 171.4)

MOSQUITO LIFE CYCLE

There are several species of mosquito that readily attack people, and some species are capable of transmitting microbial organisms that cause human diseases such as malaria and encephalitis. The mosquitoes of major concern in Washington belong to the genera *Culex, Culiseta, Aedes*, and *Anopheles*.

Mosquitoes are classified as Insects of the Diptera order. They undergo a complete metamorphosis, which involves four stages of development, egg, larva, pupa and adult. The first three stages occur in water, but the adult female is an active flying insect that feeds upon the blood of humans and/or animals. The female mosquito lays the eggs directly on water or on moist substrates that may later be flooded with water. The egg later hatches into the larva, which is the stage on which most mosquito districts tend to focus control programs. During the larval stages it continues to feed and grow in size. The larvae go through four growth stages called instars. Once the larva has developed to the fourth instar it stops feeding and pupates. This is a resting period. At this point the biological control (larvicide) no longer works as a control measure because it requires ingestion by the organism. Draining or emptying the water at this point will kill the pupa, as they are unable to live out of water.

The larva transforms into the pupa where internal changes occur and the adult mosquito takes form. After a few hours to a few days in the pupal stage, the adult mosquito emerges from the water surface and seeks shelter in shady, moist areas. Adult mosquitoes must find shelter during the heat to avoid dehydration and are most active during the hours from dawn to dusk. After a brief period of rest the adult female goes in search of a blood meal and the cycle continues. The time frame for this is highly variable anywhere from one to three weeks, depending on the temperature of the water. The warmer the water the quicker the development will be. A very small amount of water in a container in the sun will produce a batch of adult mosquitoes very quickly.

Mosquito biology can follow two general scenarios. The first involves those species that lay their eggs in masses or rafts on the water's surface. Some of these species, which are found throughout the U.S., often lay their eggs in natural or artificial water-holding containers found in the domestic environment, or in naturally occurring pools. In summer the entire life cycle, from egg to adult, may be completed in a week or less.

The second scenario involves *Aedes* mosquitoes that lay their eggs on moist soil or other substrates in areas that will be flooded with water later. After about two days, these eggs are ready to hatch, but if not flooded, can withstand drying for months and longer. In inland areas of the U.S. where these mosquitoes breed, heavy rains and flooding can produce millions of mosquitoes in a short time. Similar situations occur along coastal areas with mosquitoes adapted

to salt marsh habitats. Some salt marsh mosquitoes are strong fliers and can sometimes travel up to 50 miles from the breeding site.

PUBLIC HEALTH IMPACTS

Female mosquitoes of nearly all species require blood from vertebrate animals to develop eggs, and many species bite people, pets, and livestock for this purpose.

Mosquitoes are found throughout the world and many transmit pathogens which may cause disease. These diseases include mosquito-borne viral encephalitis, dengue, yellow fever, malaria, and filariasis. Most of these diseases have been prominent as endemic or epidemic diseases in the United States in the past, but today, only the insect-borne (arboviral) encephalitides occur annually and dengue occurs periodically in this country. The most important consequence of this is the transmission of microorganisms that cause diseases such as western equine encephalomyelitis and St. Louis encephalitis. Both of these diseases can cause serious, sometimes fatal neurological ailments in people. (Western equine encephalomyelitis virus also causes disease in horses.) Western equine encephalomyelitis infections tend to be more serious in infants while St. Louis encephalitis can be a problem for older people.

These viruses are normally infections of birds or small mammals. During such infections, the level of the virus may increase in these infected animals facilitating transmission to humans by mosquitoes. The West Nile virus, which can also cause encephalitis, was found in the northeastern United States for the first time in 1999, and is a good example of this mode of transmission. Human cases of encephalitis range from mild to very severe illnesses that, in a few cases, can be fatal.

Other pathogens transmitted by mosquitoes include a protozoan parasite which causes malaria, and *Dirofilaria immitis*, a parasitic roundworm and the causative agent of dog heartworm. Disease carrying mosquito species are found throughout the U.S., especially in urban areas and coastal or in inland areas where flooding of low lands frequently occurs.

Even when no infectious diseases are transmitted by mosquitoes, they can be a health problem to people and livestock. Mosquito bites can result in secondary infections, allergic reactions, pain, irritation, redness, and itching.

MANAGEMENT

Mosquitoes are best managed on an area wide basis by public agencies that are either components of local health departments or are independent districts organized specifically for mosquito control. In Washington, there are approximately 12 mosquito and vector control districts. Some are small and have responsibility for mosquito abatement in a few hundred square miles, while the activities of others may encompass one entire county or more. Mosquito control is accomplished by searching out mosquito larvae in standing water and treating the water with a material that kills the larvae. Many materials currently in use are biological in origin and are highly specific for mosquitoes, with little or no effect on other organisms.

On occasion, mosquito abatement agencies may also apply chemical pesticides to kill adult mosquitoes, but ordinarily only when adult populations become so large that they cause extreme annoyance to many people or when the threat of disease transmission to people is high. Control of irrigation water in agricultural areas to avoid excess runoff is an important mosquito control method, but in recent years, elimination of small bodies of water that can serve as wildlife habitat has ceased to be a mosquito control option because of habitat preservation concerns.

INTEGRATED PEST MANAGEMENT

Mosquito control activities are important to the public health, and responsibility for carrying out these programs rests with state and local governments. The federal government assists states in emergencies and provides training and consultation in vector and vector-borne disease problems when requested by the states. The current interests in ecology and environmental impact of mosquito control measures, and the increasing problems that have resulted from insecticide resistance emphasize the need for "integrated" control programs. IPM is an ecologically based strategy that relies heavily on natural mortality factors and seeks out control tactics that are compatible with or disrupt these factors as little as possible. IPM includes the use of pesticides, but only after systematic monitoring of mosquito populations indicates a need. Ideally, an IPM program considers all available control actions, including no action, and evaluates the interaction among various control practices, cultural practices, weather, and habitat structure. This approach thus uses a combination of resource management techniques to control mosquito populations with decisions based on surveillance. Fish and game specialists and natural resources biologists should be involved in planning control measures whenever delicate ecosystems could be impacted by mosquito control practices.

A good integrated pest management (IPM) program -- featuring monitoring for high mosquito populations and disease, resident education and action to maximize natural controls and minimize mosquito breeding sites, and larvaciding (killing immature mosquitoes) when necessary -- can control mosquitoes more effectively while reducing pesticide exposure to humans and the environment. Insecticides are dispersed only where mosquito larvae are present and not indiscriminately, which is why larvaciding is much sounder than adulticiding.

The underlying philosophy of mosquito control is based on the fact that the greatest control impact on mosquito populations will occur when they are *concentrated*, *immobile* and *accessible*. This emphasis focuses on habitat management and controlling the immature stages before the mosquitoes emerge as adults. This policy reduces the need for widespread pesticide application in urban areas.

DESCRIPTION OF MOSQUITO CONTROL ACTIVITIES

MOSQUITO CONTROL PROGRAMS

In response to these potential disease carrying pests, communities organized the earliest mosquito control programs in the eastern U.S. in the early 1900s. Eventually, other communities created similar programs throughout the country in areas where mosquito problems occurred and

where citizens demanded action by local officials. Modern mosquito control programs in the U.S. are multifaceted and include surveillance, source reduction, and a variety of larval and adult mosquito control strategies.

Surveillance methods include studying habitats by air, aerial photographs, and topographic maps, and evaluating larval populations. Mosquito control officials also monitor mosquito traps, biting counts, and complaints and reports from the public. Mosquito control activities are initiated once established mosquito threshold populations are exceeded. Seasonal records are kept in concurrence with weather data to predict mosquito larval occurrence and adult flights. Some mosquito control programs conduct surveillance for diseases harbored by birds, including crows, other wild birds, sentinel chicken flocks, and for these diseases in mosquitoes.

Source reduction involves eliminating the habitat or modifying the aquatic habitat to prevent mosquitoes from breeding. This measure includes sanitation measures where artificial containers, including discarded automobile tires, which can become mosquito habitats, are collected and properly disposed. Habitat modification may also involve management of impounded water or open marshes to reduce production and survival of the flood water mosquitoes. If habitat modification is not feasible, biological control using fish may be possible. Mosquito control officials often apply biological or chemical larvicides, with selective action and moderate residual activity, to the aquatic habitats. To have the maximum impact on the mosquito population, larvicides are applied during those periods when immature stages are concentrated in the breeding sites and before the adult forms emerge and disperse.

CRITERIA FOR COVERAGE UNDER THE GENERAL PERMIT

Applicants for the general permit will be screened based on information in the application. The department will consider whether the applicant has a qualified licensed applicator on staff, familiarity with FIFRA and state requirements, and willingness to develop monitoring plans and an IPM, if not already developed.

TABLE 1. PERMITTED INSECTICIDES USED FOR MOSQUITO CONTROL

Typical Products	**Active ingredient**	**Label use rate**	**Use**
Aquabac Bactimos Vectobac Teknar	*Bacillus thuringiensis israelensis (*Bti*)*	0.25 to 2 pints/acre or up to 10 lbs/acre	Larvae control
VectoLexWDG	*Bacillus sphaericus* (H-5a5b)	0.5 to 1.5 lbs/acre	Larvae control in water with high organic content
Altosid	Methoprene	2 to 20 lbs/acre	Larvae control

Agnique MMF	Monomolecular surface film	0.2 to 0.5 gal/acre	Larvae and Pupae control
Golden Bear Oil Bonide Oil	Petroleum distillate	3 to 5 gal/acre	Larvae and Pupae control
Malathion	Malathion	0.5 pts/acre	Emergency use only
Abate	Temephos	0.5 to 1.5 oz/acre	Emergency use only

BACILLUS THURINGIENSIS ISRAELENSIS (BTI):

The product known as Bti (*Bacillus thuringiensis israeliensis*) can be as effective as chemical insecticides in liquid and granular form. Bti is an endospore-forming bacterium that is ingested by the actively feeding larvae. When the bacteria Bti encysts, it produces a protein crystal toxic to mosquito and midge larvae. Once the bacteria have been ingested, the toxin disrupts the lining of the larvae's intestine. Bti is highly selective for the first through third instar of mosquito and some gnat larvae. It has no effect on a vast array of other aquatic organisms except midges in the same habitat. Bti strains are sold under the names Bactimos®, Teknar® and Vectobac®.

Vectobac is formulated by impregnating corn kernels with bacteria known as *Bacillus thuringensus.* This bacterium is target specific and must be ingested by the target species to be of any effect.

Bti is the primary material used for mosquito control because of its low toxicity to non-target species. Bti is highly pathogenic against Culcidae (mosquitoes) and Simuliidae (blackflies) and has some virulence against certain other Diptera, especially Chironomidae (midges). Lepitdopterans are not generally considered susceptible, with some limited exceptions. Timing of treatment is important and Bti must be applied frequently.

Bti has been extensively studied for effects on non-target organisms and environmental consequences of use with no reported adverse effects. It is not toxic to bees. According to several studies, when applied at field application rates, Bti has no reported effect on fish and amphibians. Several studies have found no effect on warm-blooded mammals. Labels indicate that direct contact with the products may cause mild to moderate eye or skin irritation.

Bti products are available in liquid, pellet and granular formulations. The type of formulation influences persistence, with the pellet/briquette forms having greater persistence. Generally Bti does not persist long after application, with toxicity persisting from 24 hours to over one month when the pellet/briquette formulation is used because of its slow release formula. Because of its specificity, Bti lacks the ability to recycle readily in insect populations. Factors that influence its

persistence include UV, agitation, sedimentation, water quality and environmental conditions such as pH and temperature.

BACILLUS SPHAERICUS:

B. sphaericus is a naturally occurring, spore-forming bacterium which produces a protein endotoxin at the time of sporulation. The toxin is only active against the larval stage and must be ingested and digested before it becomes activated. *B. sphaericus* has the unique property of being able to control mosquito larvae in highly organic aquatic environments such as waste lagoons and stormwater catch basins.

B. sphaericus is effective against *Culex spp*; it is less effective against other species. *B. sphaericus* is not acutely toxic to freshwater and saltwater invertebrates, honeybees, mayfly larvae, does not appear to be harmful to fish and other marine life, and is not toxic to birds on a subchronic basis. In tests, *B. sphaericus* was not pathogenic, infective nor toxic in laboratory animals by the oral, dermal, pulmonary or intra-venous routes of exposure. In humans, mild skin and eye irritation can occur with direct contact.

VectoLex, the trade name for *B. sphaericus,* persists for 2-4 weeks after a single application at label rates. *B. sphaericus* may undergo limited recycling in certain organically rich environments, extending the period of larval control.

METHOPRENE

Methoprene mimics a natural juvenile hormone, and when present in the larval habitat it keeps immature insects from maturing into adults. Unable to metamorphose, the mosquitoes die in the pupal stage. Methoprene comes in a liquid, granular or pellet form and is applied directly to the water where mosquito larvae are found. When mosquito larvae are exposed to methoprene, their life cycle is disrupted, and they are prevented from reaching maturity or reproducing.

Studies indicate that methoprene is of low toxicity and poses little risk to people when used according to label instructions. Methoprene was not shown to have any significant toxicological effects in the standard battery of toxicity studies used to assess Human health effects. The pesticide has very low acute oral and inhalation toxicity potential and is not an eye or skin irritant. Methoprene is also of low acute dermal (skin) toxicity and is not a human skin sensitizer.

In laboratory tests, methoprene has been shown to be practically non-toxic to mallard ducks and only slightly toxic to fish. Although it has been observed to be very highly toxic to freshwater invertebrates, results from field studies involving methoprene have shown that it has no lasting adverse effects on populations of invertebrates or other non-target aquatic organisms when used according to label instructions for mosquito control. Negative impacts on aquatic invertebrates were not permanent and the populations were able to recover.

Methoprene is not persistent in the environment. It degrades rapidly in water, being susceptible to transformation by sunlight and microorganisms.

MONOMOLECULAR SURFACE FILMS

MSF is a non-petroleum surface oil that acts as a physicochemical agent by altering the mosquito's habitat. It belongs to the alcohol ethoxylate group of surfactants, which are used in detergent products. MSF disrupts the cohesive properties, which allow mosquitoes to use the water's surface as an interface for breeding. By making the surface "wetter", MSF in effect drowns mosquitoes.

MSF kills larvae and pupae by making it impossible for them to keep their breathing tubes above the water's surface. It also kills adult females by entrapping and drowning them when they contact the surface to lay their eggs. Since MSF kills mosquitoes with a physical mechanism (rather than a toxic mechanism), it is not effective in habitats with persistent unidirectional winds of greater than ten miles per hour, or in areas with very choppy water

Some species such as the midge, and some arthropods that require attachment to the water surface have been shown to be affected. MMF is non-toxic to most non-target wildlife. The green tree frog progressed normally from tadpole to adult through several generations after being exposed to a constant film presence for six months. MMF is not a skin irritant, is only a mild eye irritant on prolonged or repeated contact, and is considered to be non-toxic by animal tests. As with all pesticides, direct contact should be avoided.

The film persistence is dependent on temperature, water flow, amount of bacteria in the water, and the duration and strength of the wind following application. Average persistence under standard use conditions is 5 - 14 days at recommended dosage rates.

LARVICIDAL OILS

Oils have been used for mosquito control for more than a century. Golden Bear 1111® is a light viscosity oil that spreads quickly and evenly over the water surface, preventing larvae and pupae from obtaining oxygen through the surface film. Oils have always been used as a product of last resort for the control of mosquito pupae, since this stage does not feed but does require oxygen. The only other option would be draining the source. Closer surveillance and timing of other agents and techniques can greatly reduce the need for larvicidal oils.

Golden Bear forms a thin sheet of oil on the surface water and persists for 12 to 15 hours. It suffocates many aquatic insects by interfering with the insects' breathing tubes. Apparently, Golden Bear does not affect fish directly because the oil remains on the water's surface for only a short period, then evaporates. In fish-bearing waters, it may affect fish indirectly by depleting their food source. Aquatic invertebrates, amphibians, waterfowl; and furbearers may be deleteriously affected. Consequently, to determine whether any species of concern (endangered, threatened, and/or economically valuable) inhabit the area to be treated, coordination with the Department of Fish and Wildlife and Department of Natural Resources' Natural Heritage Program is required before Golden Bear oil may be used.

CHEMICAL LARVICIDES, ORGANOPHOSPHATES

Costs and complexity of mosquito control have increased markedly since the passage of the Environmental Protection Act in 1969. The increasing number of governmental regulations and permitting bodies, rising costs of alternative chemicals, and the spreading resistance of many vector species to existing pesticides have almost completely changed or eliminated the use of chemical control agents. The emergency use of malathion and temephos is retained under this permit with the permission of the Dept of Health and Ecology. The two situations where malathion and temephos may be used are in response to pesticide resistance and where a public health emergency has been declared.

The primary application methods in aquatic mosquito larvae and pupa control are:

1. Hand application: Broadcast spreaders, backpack granulators and liquid sprayers are used to spread control materials either mounted on ATVs or carried by the applicator.

2. Aerial applications: Aerial applications normally use a conventional spray boom to improve coverage with the smaller volume of spray solution applied per acre. The spray produces a large droplet size at low pressure and low volume. The pilot monitors the flow rate to minimize pressure and controls drift additionally through application during lower air temperatures and low wind speed.

ENDANGERED SPECIES

Currently, EPA is developing a program ("The Endangered Species Protection Program") to identify all pesticides whose use may cause adverse impacts on endangered and threatened species and to implement mitigation measures that will eliminate the adverse impacts. The program would require use restrictions to protect endangered and threatened species at the county level. In the future, EPA plans to publish a description of the Endangered Species Program in the Federal Register and have available voluntary county-specific bulletins.

REGULATORY POLLUTION REDUCTION REQUIREMENTS

Federal and state regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations are set by regulation or developed on a case-by-case basis (40 CFR 125.3, and Chapter 173-220 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992). The more stringent of these two limits must be chosen for each of the parameters of concern.

TECHNOLOGY BASED WATER QUALITY PROTECTION REQUIREMENTS

Sections 301, 302, 306, and 307 of the FWPCA established discharge standards, prohibitions, and limits based on pollution control technologies. These technology-based limits are "best

practical control technology" (BPT), "best available technology economically achievable" (BAT), and "best conventional pollutant control technology economically achievable" (BCT). Compliance with BPT/BAT/BCT may be established using a "best professional judgment" (BPJ) determination.

The state has similar technology-based limits that are described as "all known, available and reasonable methods of control, prevention, and treatment" (AKART) methods. AKART is referred to in state law under RCW 90.48.010, RCW 90.48.520, 90.52.040 and RCW 90.54.020. The federal technology-based limits and AKART are similar but not equivalent. AKART: (1) may be established for an industrial category or on a case-by-case basis; (2) may be more stringent than Federal regulations; and (3) includes not only treatment, but also BMPs such as prevention and control methods (i.e. waste minimization, waste/source reduction, or reduction in total contaminant releases to the environment). The department and the federal Environmental Protection Agency (EPA) concur that, historically, most discharge permits have determined AKART as equivalent to BPJ determinations.

The pesticide application industry has been regulated by EPA under the terms of the Federal Insecticide, Fungicide, and Rodenticide Act, *(*FIFRA). Use of pesticides is regulated by label use requirements developed by EPA. In developing label use requirements, EPA requires the pesticide manufacturer to register each pesticide and provide evidence that the pesticide will work as promised and that unacceptable environmental harm will be minimized. The standards for environmental protection are different between the CWA and FIFRA.

It is the intent of this general permit to authorize mosquito control in a manner that also complies with federal and other state requirements.

All WWDPs issued by the department must incorporate requirements to implement reasonable prevention, treatment and control of pollutants.

The legislature established in the Washington Pesticide Control Act that prevention of pollution in this case is reasonable in the context of an Integrated Pest Management Plan. IPMs require the investigation of all control options, but stop short of requiring nonchemical pest controls as the preferred option. The goal of IPMs is to establish the most effective means of control whether biological, chemical, nonchemical, or a combination. Most mosquito control strategies are such a combination.

Treatment of the pollutants addressed in this permit is difficult due to the diffuse nature and low concentrations that exist after the pesticides have become waste. The Talent decision established that aquatic pesticides become waste in the water after the pesticide has performed its intended action and the target organisms are controlled. Treatment of waters where pesticide residues threaten to cause unacceptable environmental harm may be needed in some situations, but not routinely.

WATER QUALITY BASED REQUIREMENTS

The mosquito control activities affect surface waters of the state. These waters are protected by chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington. The purpose of these standards is to establish the highest quality of state waters, through the reduction or elimination of contaminant discharges to the waters of the state, consistent with: public health; public enjoyment; the propagation and protection of fish, shellfish, and wildlife; and existing and future beneficial uses. This purpose is reached, in part, by compliance with the limitations, terms and conditions of the General Permit.

The mosquito control activities which discharge, directly or indirectly, to surface waters shall be required to meet the state water quality standards for Class A and Class AA surface waters as given in chapter 173-201A WAC. The characteristic beneficial uses of Class AA and A surface waters include, but are not limited to, the following: domestic, industrial and agricultural water supply; stock watering; the spawning, rearing, migration and harvesting of fish; the spawning, rearing and harvesting of shellfish; wildlife habitat; recreation (primary contact, sport fishing, boating, and aesthetic enjoyment of nature); commerce and navigation.

RCW 90.48.035 authorizes establishment of water quality standards for waters of the state. The state has implemented water quality standards in chapter 173-201A WAC. All waste discharge permits issued pursuant to NPDES or SWD regulations are conditioned in such a manner that all authorized discharges shall meet state water quality standards. Standards include an "antidegradation" policy which states that beneficial uses shall be protected.

The department has deemed that, when properly applied and handled in accordance with the terms and conditions of the general permit, mosquito control activities will comply with state water quality standards, will maintain and protect the existing characteristic beneficial uses of the surface waters of the state, and will protect human health. New information regarding previously unknown environmental and human health risks may cause reopening of the general permit.

No mixing or dilution zone shall be authorized to the permit holder for any discharge to surface waters under this general permit. The short term water quality modification provisions of the permit will allow the discharges authorized by the general permit to cause a temporary diminishment of some beneficial uses while the water body is altered to protect public health and promote public enjoyment and quality of life. The short term modification will be short in that the actual impairment will be short lived, while the overall availability of authorization extends through the term of the permit. The integrated pest management plan to be developed prior to the second year of the general permit term satisfies the regulatory requirement for a long term plan that allows short term modifications to extend for five years.

The activities authorized by this general permit do not have a reasonable potential to cause a violation of state water quality standards (WAC 173-201A) so long as the activities are allowed under the short term water quality mod. The water quality mod provides for an exception to meeting certain provisions of the state water quality standards such as meeting all beneficial uses all the time. Activities covered under this permit are allocated a temporary zone of impact on beneficial uses, but the impact must be transient, and must allow for full restoration of water

quality and protection of beneficial uses upon project completion. The conditions of this permit constitute the requirements of a short term water quality modification.

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The department has determined that the applicant's discharge does not contain chemicals of concern based on existing data or knowledge. The discharge will be re-evaluated for impacts to human health at the next permit reissuance.

SEDIMENT QUALITY

The department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the department may require permit holders to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the sediment management standards.

SEPA COMPLIANCE

Mosquito control activities have undergone numerous environmental impact evaluations. The use of pesticides is conditioned to mitigate environmental impacts of concern noted in these evaluations. This general permit will undergo SEPA. The conditions of this permit should satisfy any water quality related SEPA concerns.

RECEIVING WATER IDENTIFICATION

Eligibility and Geographical Area of Coverage

For the purposes of the general permit, the mosquito control activities for which the general permit is valid include surface waters of the entire state. Mosquito control activities are scattered throughout the state. MCDs are located in the following counties or areas: Adams County, Benton County, Camano Island, Clark County, Cowlitz County, Curlew (Ferry County), Grant County, Southwest Washington, Rosalia (Whitman County), Columbia and Touchet-Lowden area (Walla Walla County), and Yakima County. Other areas may be treated by private operators.

More MCDs may be formed and more places may be treated by contract, especially urban areas. This will occur rapidly if mosquito born diseases begin showing up in the state.

Mosquito districts and other pesticide applicators are required to be covered by the general permit for the following pre adult life stage pesticide activities which occur in surface waters of the state:

1) Into water bodies that are contiguous with rivers, creeks, and lakes, or
2) Into navigable waters, or
3) In other situations as determined by the department.

Some mosquito larvacide applications are a low priority because of minimal environmental impact, particularly when compared with the desirability of mosquito control. These situations are derived in part from exclusions to the definition of “waters of the United States” in 33CFR Part 328.3. These include:

1) On land which is in agricultural use where the mosquito control is performed in inconsequential areas such as puddles, hoof prints, or intermittent wet areas, where treatment would have no environmental impact except to mosquito larvae, or
2) In man-made retention or detention ponds for wastewater or stormwater treatment.

These situations are described so that the department and the mosquito control industry are not burdened by oversight and permit requirements in situations where a permit would add no additional environmental protection of beneficial uses. The department prefers to focus on the more significant water quality threats for permitting as opposed to the less significant ones that won't adversely affect water quality or related habitat. Much of the mosquito control work consists of applying larvacides in seasonal, isolated, and shallow ponds and agricultural land where no fish are present and the larvacide has no impact on wildlife other than mosquitoes.

PROCEDURE FOR CONDITIONAL APPROVAL FOR THE DISCHARGE OF WASTEWATER CONTAINING PRODUCTS NOT SPECIFIED IN THE CURRENT PERMIT

The industry indicated that they might lose the use of some pesticides in the current EPA re-registration process and were concerned about the length of time necessary to do a permit modification to allow the use of a new product. In response to this concern a procedure will be developed to allow conditional use of a new product until the next permit renewal. This procedure will require the industry to submit a risk assessment for the department's approval. This risk assessment must contain 1) verification that the new product will meet the specified general conditions and prohibitions, 2) contain certain specified information about the product and its environmental fate, and 3) specify a monitoring plan to verify performance. Based upon the information in the risk assessment the department will either grant or deny conditional approval for the use of the new product.

BEST MANAGEMENT PRACTICES

The industry should continue to examine the possibility of alternatives to reduce the need for aquatic pesticides. Such methods include:

1) Applying pesticide only when mosquito larvae are present at a level that will constitute a nuisance.
2) Using the least intrusive method of pesticide application.
3) All errors in application and spills are reported to the proper authority.
4) No spraying of adult mosquitoes over surface waters of the state.
5) Informing the public of planned spray activities.
6) Public education efforts to reduce potential mosquito breeding habitat.
7) Applying a decision matrix concept to the choice of the most appropriate formulation.
8) Staff training in the proper application of pesticides and handling of spills.

Labels specify some additional BMPs

An important goal of the first permit cycle is to reinforce the concept of reduction in pesticide residuals. A reduction in the discharge of pollutants to waters of the state can be achieved by using proper BMPs, which include integrated pest management and alternative pest control procedures. While many aquatic pesticide applications are already using proper IPMs, some are not adequate to meet the terms and conditions of the general permit that has been developed to protect the quality of state waters.

OTHER PERMIT CONDITIONS

MONITORING

Monitoring of residual pesticides may be required to confirm assumptions of safety when applications are performed in compliance with the FIFRA label and state requirements. A permit holder may propose and gain approval for a monitoring plan in lieu of monitoring each application. The permit holder may optionally participate in a group monitoring effort. The intent is to gather information to confirm the assumptions of persistence and toxicity relative to the rate of application. This information may better define the period of temporary diminishment of beneficial uses.

REPORTING AND RECORDKEEPING

The conditions of S3. are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-226-090).

LAB ACCREDITATION

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.*

SMALL BUSINESS ECONOMIC IMPACT ANALYSIS

The general permit requires compliance with federal and state laws and regulations and places no disproportionate burden on small business. The monitoring is flexible and meeting pesticide label requirements is already required under FIFRA.

PERMIT MODIFICATIONS

The department may modify this permit to impose new or modified numerical limitations, if necessary to meet Water Quality Standards for Surface Waters, Sediment Quality Standards, or Water Quality Standards for Ground Waters, based on new information obtained from sources such as inspections, effluent monitoring, or department approved engineering reports. The department may also modify this permit because of new or amended state or federal regulations.

WHEN COVERAGE IS EFFECTIVE

Unless the department either responds in writing to any facility's Application for Coverage or obtains relevant written public comment, coverage under this general permit of such a facility will commence on the later of the following:

- The fourteenth day following receipt by the department of a completed and approved Application for Coverage;
- The thirty-first (31st) day following the end of a thirty (30) day public comment period; or
- The effective date of the general permit.

If the department responds in writing to any facility's Application for Coverage or obtains relevant written public comment, coverage under this general permit of such a facility will not commence until the department is satisfied with the results obtained from written correspondence with the individual facility and/or the public commenter.

RESPONSIBILITY TO COMPLY WITH OTHER REQUIREMENTS

The department has established, and will enforce, limits and conditions expressed in the general permit for the discharge of wastes containing various pesticides registered for use by the EPA and the Washington State Department of Agriculture. These agencies will enforce the use, storage and disposal requirements expressed on pesticide labels. The Permit holder must comply with both the pesticide label requirements and the general permit conditions. The general permit does not supersede or preempt federal or state label requirements or any other applicable laws and regulations. General permit Condition G15 reminds the permit holder of this fact.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and are included in all aquatic pesticide general permits.

RECOMMENDATION FOR PERMIT ISSUANCE

The general permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. The department proposes that the general permit be issued for five (5) years.

APPENDIX A – PUBLIC OPPORTUNITY TO COMMENT

PUBLIC COMMENT AND INFORMATION

A Public Notice of Draft (PNOD) was published in the State Register on February 6, 2002. A public hearing on the draft General Permit will be held on March 12 in the city of Ellensburg at Hal Holmes center. A one hour workshop to explain proposed changes and answer questions will be held immediately preceding the hearings.

Interested persons are invited to submit comments regarding the proposed issuance of the General Permit. Comments on the general permit may be delivered at the public hearings as either written or oral testimony. Written comments may also be submitted to the Ecology Office at the address below:

Washington State Department of Ecology
Water Quality Program
Attention: Kathleen Emmett, General Permits Manager
PO Box 7600
Olympia, WA 98504-7600

All comments must be submitted by 5 p.m. on March 12, 2002 to be considered in the final permit determination. A responsiveness summary will be prepared and available for public review. It will be sent to all parties who submitted comments by the deadline.

The proposed and final general permit, fact sheet, application form, and other related documents are on file and may be inspected and copied from Ecology WebPages: http://www.ecy.wa.gov/programs/wq/herbicides/npdes_develp.html and between the hours of 8:00 a.m. and 4:30 p.m. weekdays at the following Department locations:

Washington State Department of Ecology
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902
(509) 454-7298
TDD (509) 454-7673
FAX (509) 575-2809
Contact: Ray Latham

Washington State Department of Ecology
Eastern Regional Office
North 4601 Monroe, Suite 202
Spokane, WA 99205
(509) 456-2874
TDD (509) 458-2055
FAX (509) 456-6175
Contact: Nancy Weller

Washington State Department of Ecology
Northwest Regional Office
3190 - 160th Ave. SE
Bellevue, WA 98008-5452
(425) 649-7133
TDD (435) 649-4259
FAX (425)649-7098
Contact: Tricia Shoblom

Washington State Department of Ecology
Southwest Regional Office
PO Box 47775
Olympia, WA 98504-7775
(360) 407-6300
TDD (360) 407-6306
FAX (360) 407-6305
Contact: Janet Boyd

APPENDIX B -- GLOSSARY

DEFINITIONS

"Administrator" means the administrator of the EPA.

“Antidegradation Policy” is as stated in WAC 173-201A-070.

"Authorized representative" means:

1. If the entity is a corporation, the president, secretary, treasurer, or a vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operation facilities, if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

2. If the entity is a partnership or sole proprietorship, a general partner or proprietor, respectively; and

3. If the entity is a federal, state or local governmental facility, a director or the highest official appointed or designated to oversee the operation and performance of the activities of the government facility, or his/her designee.

The individuals described in paragraphs 1 through 3, above, may designate another authorized representative if the authorization is in writing, the authorization specifies the individual or position responsible, and the written authorization is submitted to the department.

"Best management practices (BMPs)" means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the state and their sediments. BMPs also include, but are not limited to, treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

"**Certified applicator"** means any individual who is licensed as a commercial pesticide applicator, commercial pesticide operator, public operator, private-commercial applicator, demonstration and research applicator, or certified private applicator, or any other individual who is certified by the director to use or supervise the use of any pesticide which is classified by the EPA or the director as a restricted use pesticide.

"Code of Federal Regulations (CFR)" means a codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government. Environmental regulations are in Title 40.

"Composite sample" means the combined mixture of not less than four (4) "discrete samples" taken at selected intervals based on an increment of either flow or time. Volatile pollutant discrete samples must be combined in the laboratory immediately prior to analysis. Each discrete

sample shall be of not less than 200 ml and shall be collected and stored in accordance with procedures prescribed in the most recent edition of Standard Methods for Examination of Water and Wastewater[27].

"Conveyance" means a mechanism for transporting water or wastewater from one location to another location including, but not limited to, pipes, ditches, and channels.

"Daily maximum" means the greatest allowable value for any calendar day.

"Daily minimum" means the smallest allowable value for any calendar day.

"Dangerous waste" means the full universe of wastes regulated by Chapter 173-303 WAC, including hazardous waste.

"Degrees C" means temperature measured in degrees Celsius.

"Degrees F" means temperature measured in degrees Fahrenheit.

"Department" means the Washington State Department of Ecology.

"Detention" means the collection of water into a temporary storage device with the subsequent release of water either at a rate slower than the collection rate, or after a specified time period has passed since the time of collection.

"Director" means the director of the Washington State Department of Ecology or his/her authorized representative.

"Discharger" means an owner or operator of any "facility", "operation", or activity subject to regulation under Chapter 90.48 RCW.

"Discrete sample" means an individual sample which is collected from a wastestream on a one-time basis without consideration to flow or time, except that aliquot collection time should not exceed fifteen (15) minutes in duration.

"Effluent limitation" means any restriction established by the local government, the department, and EPA on quantities, rates, and concentrations of chemical, physical, biological, and/or other effluent constituents which are discharged from point sources to any site including, but not limited to, waters of the state.

"Environmental Protection Agency (EPA)" means the U.S. Environmental Protection Agency or, where appropriate, the term may also be used as a designation for a duly authorized official of said agency.

"Erosion" means the wearing away of the land surface by movements of water, wind, ice, or other agents including, but not limited to, such geological processes as gravitational creep.

"Existing operation" means an operation which commenced activities resulting in a discharge, or potential discharge, to waters of the state prior to the effective date of the general permit for which a request for coverage is made.

"Facility" means the actual individual premises owned or operated by a "discharger" where process or industrial wastewater is discharged.

"FWPCA" means the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.), as now or as it may be amended.

"General permit" means a permit which covers multiple dischargers of a point source category within a designated geographical area, in lieu of individual permits being issued to each discharger.

"Gpd" means gallons per day.

"Grab sample" is synonymous with "discrete sample".

"Ground water" means any natural occurring water in a saturated zone or stratum beneath the surface or land or a surface water body.

Hazardous waste" means those wastes designated by 40 CFR Part 261, and regulated by the EPA.

"Individual permit" means a discharge permit for a single point source or a single facility.

"Industrial wastewater" means water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feedlots, poultry house, or dairies. The term includes contaminated storm water and also, leachate from solid waste facilities.

"Mg/L" means milligrams per liter and is equivalent to parts per million (ppm).

"Monthly average" means that value determined by the summation of the instantaneous measurements during any single month divided by the number of instantaneous measurements collected during that same single month.

"Municipal sewerage system" means a publicly owned domestic wastewater facility or a privately owned domestic wastewater facility that is under contract to a municipality.

"New operation" means an operation which commenced activities which result in a discharge, or a potential discharge, to waters of the state on or after the effective date of an applicable general permit.

"NPDES" means the National Pollutant Discharge Elimination System under section 402 of FWPCA.

"Operation" is synonymous with "facility".

"Party" means an individual, firm, corporation, association, partnership, co-partnership, consortium, company, joint venture, commercial entity, industry, private corporation, port district, special purpose district, irrigation district, trust, estate, unit of local government, state government agency, federal government agency, Indian tribe, or any other legal entity whatsoever, or their legal representatives, agents, or assignee.

"Permit" means an authorization, license, or equivalent control document issued by the department to implement Chapter 173-200 WAC, Chapter 173-216 WAC and/or Chapter 173-226 WAC.

"Person" is synonymous with "party".

"pH" means the logarithm of the reciprocal of the mass of hydrogen ions in grams per liter of solution. Neutral water, for example, has a pH value of 7 and a hydrogen-ion concentration of 10^{-7}. pH is a measure of a substance's corrosivity (acidity or alkalinity).

"Point source" means any discernible, confined and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture.

"Pollutant" means any substance discharged, if discharged directly, would alter the chemical, physical, thermal, biological, or radiological integrity of the waters of the state, or would be likely to create a nuisance or render such waters harmful, detrimental or injurious to the public health, safety or welfare, or to any legitimate beneficial use, or to any animal life, either terrestrial or aquatic. Pollutants include, but are not limited to, the following: dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, pH, temperature, TSS, turbidity, color, BOD_5, TDS, toxicity, odor and industrial, municipal, and agricultural waste.

"Priority pollutant" means those substances listed in the federal 40 CFR Part 423, Appendix A, or as may be amended.

"Process wastewater" means water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product.

"Publicly owned treatment works (POTW)" is synonymous with "municipal sewerage system".

"Reasonable times" means at any time during normal business hours; hours during which production, treatment, or discharge occurs; or times when the department suspects occurrence of a violation.

"Regional administrator" means the regional administrator of Region X of the EPA or his/her authorized representative.

"Retention" means the collection of water into a permanent storage device, with no subsequent release of water.

"Severe property damage" means substantial physical damage to property, damage to the pretreatment facilities or treatment/disposal facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays or losses in production.

"Shall" is mandatory.

"Significant" is synonymous with "substantial".

"Significant process change" means any change in a facility's processing nature which will result in new or substantially increased discharges of pollutants or a change in the nature of the discharge of pollutants, or violate the terms and conditions of this general permit, including but not limited to, facility expansions, production increases, or process modifications.

"Site" means the land or water area where any "facility", "operation", or "activity" is physically located or conducted, including any adjacent land used in connection with such facility, operation, or activity. "Site" also means the land or water area receiving any effluent discharged from any facility, operation, or activity.

"Small business" has the meaning given in RCW 43.31.025(4).

"Standard Industrial Classification (SIC) Code" means a classification pursuant to the Standard Industrial Classification Manual issued by the U.S. Office of Management and Budget.

"State" means the state of Washington.

"Substantial" means any difference in any parameter including, but not limited to, the following: monitoring result, process characteristic, permit term or condition; which the department considers to be of significant importance, value, degree, amount, or extent.

"Surface waters of the state" means all waters defined as "waters of the United States" in 40 CFR 122.2 within the geographic boundaries of the state of Washington. This includes lakes, rivers, ponds, streams, inland waters, salt waters and all other surface waters and watercourses within the jurisdiction of the state of Washington.

"Total suspended solids (TSS)" means total suspended matter that either floats on the surface of, or is in suspension in water or wastewater, expressed in mg/L.

"Toxic amounts" means any amount, i.e., concentration or volume, of a pollutant which causes, or could potentially cause, the death of, or injury to, fish, animals, vegetation or other desirable resources of the state, or otherwise causes, or could potentially cause, a reduction in the quality of the state's waters below the standards set by the department or, if no standards have been set, causes significant degradation of water quality, thereby damaging the same.

"Toxics" means those substances listed in the federal priority pollutant list and any other pollutant or combination of pollutants listed as toxic in regulations promulgated by the EPA under section 307 of the FWPCA (33 U.S.C. 1317 et seq.), or the department under Chapter 173-200 WAC, Chapter 173-201A WAC, or Chapter 173-204 WAC.

"Unirrigated" means any lands having not been irrigated within 10 days prior to, or within 60 days after the application of any wastestream.

"Upset" means an exceptional incident in which a discharger unintentionally and temporarily is in a state of noncompliance with permit effluent limitations due to factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation thereof.

"Wastewater" means liquid-carried human wastes or a combination of liquid-carried waste from residences, business buildings, or industrial establishments.

"Waters of the state" means all waters defined as "surface waters of the state" and all waters defined as "waters of the state" in RCW 90.40.020.

"Water quality" means the chemical, physical, biological characteristics of water, usually in respect to its suitability for a particular purpose.

“Water Quality Preservation Area (WQPA)” means waters which have been designated as high quality waters based upon one or more of the following criteria:

1. Waters in designated federal and state parks, monuments, preserves, wildlife refuges, wilderness areas, marine sanctuaries, estuarine research reserves, and wild and scenic rivers;
2. Aquatic habitat having exceptional importance to one or more life stage of a candidate of listed priority species, established by the state Department of Fish & Wildlife, or a federally proposed or listed threatened or endangered species;
3. Rare aquatic habitat, ecological reference sites, or other waters having unique and exceptional ecological or recreational significance.

"Water quality standards" means the state of Washington's water quality standards for ground waters of the state (Chapter 173-200 WAC) and the state of Washington's water quality standards for surface waters of the state (Chapter 173-201A WAC).

In the absence of other definitions as set forth herein, the definitions as set forth in 40 CFR Part 403.3 shall be used for circumstances concerning the discharge of wastes.

APPENDIX C -- RESPONSE TO COMMENTS

AQUATIC MOSQUITO CONTROL
GENERAL PERMIT
RESPONSE TO COMMENTS

RECEIVED DURING THE PUBLIC COMMENT PERIOD FOR
GENERAL NPDES PERMIT WAG-992000 MODIFICATION
AND
THE BEST MANAGEMNT PRACTICES FOR MOSQUITO CONTROL

This appendix contains Ecology's response to comments to the Mosquito Control General NPDES Permit WAG-992000 Modification and changes to the Best Management Practices for Mosquito Control (BMP) document received during a public review period from December 15, 2003, to March 25, 2004.

Prior to the formal public review period the Departments of Health and Fish & Wildlife, many mosquito control districts, local governments, mosquito control product manufacturers and other interested parties worked with Ecology to revise the statewide permit and BMPs to make them more pertinent and usable for those conducting mosquito control efforts in the field. Meetings were held October 14 and 15 in Moses Lake, on October 21 in Lacey, and again on March 5 in Olympia, at the Washington State Department of Agriculture. As a result, Ecology received many informal comments and suggestions that were incorporated into the proposed modifications.

Formal comments received during the public comment period pertain to wetlands, the use of methoprene and other mosquito control products, thresholds for larviciding (including preemptive methods of control), adulticiding, dipping requirements, suggestions for clarification, and other miscellaneous comments.

Commenters

1. Joseph M. Conlon, American Mosquito Control Association
2. Karl Malamud-Roam, Ph.D., Contra Costa Mosquito & Vector Control District, Concord, CA
3. Steve Foss and Wendy Sue Wheeler, Washington State Department of Agriculture
4. Ann Potter and Rocky Beach, Washington State Department of Fish & Wildlife
5. Tom Haworth, Adams County Mosquito Control District, WA
6. Kevin Shoemaker, Northwest Mosquito and Vector Control Association
7. Heather Hansen, Washington Friends of Farms and Forests
8. LaDell Yada, Washington State citizen

9. Lou Dooley, Environmental Health Director, Clark County Mosquito Control District
10. Doug Van Gundy, Wellmark International
11. William Meredith, Delaware Mosquito Control Section, Department of Fish and Wildlife
12. Wayne Switzer, Eden Advance Pest Technologies
13. Art G. Losey, Washington State Pest Control Association
14. William Peacock, City of Spokane
15. Jim Thompson, Grant County Mosquito District #1
16. Jim Tabor, WDFW
17. Mike Young, Snohomish Health District
18. Gerald Campbell, Grant County Health District
19. Mark Newberg, Wellmark International
20. Benjamin Hamilton, Washington State Department of Health
21. David Ensunsa, Columbia Mosquito Control District
22. Dan Mathias, City of Everett

Comments have been summarized and those commenting are referenced by the number given to them above. Where comments resulted in a change to either the BMP document or the permit, that change is noted.

Wetlands

Comment 1. The role of natural predation in the control of mosquitoes in the document and the webpage from which it is derived is somewhat overstated. Although there is a wealth of literature recording observations and extolling the importance of the Odonata as predators of diurnally active adult mosquitoes, this has not been supported by controlled field studies. While predation provides a worthy and welcome contribution to our integrated mosquito control efforts, it simply cannot provide the level of control needed when human lives are at stake This is certainly not meant to downplay the important part proper wetlands management plays in ecology and a fully-integrated mosquito management strategy, for the American Mosquito Control Association fully supports and endorses proper wetlands management. But I would caution against promulgating this as the sole means of mosquito control in areas where these wetlands are found. I would advise further caution against underestimating the potential magnitude of mosquito production even in natural, healthy wetlands. (1, 11, 12)

Response to Comment 1. *Mosquito "outbreaks" most often occur in destabilized wetland and stream ecosystems that have been changed or tampered with so that the predators of the larvae such as*

invertebrates, insects, and amphibians are excluded. Ecology does not suggest that predation is the only means of mosquito control for wetlands. While draining and/or filling wetlands are not approved methods, taking an integrated approach that targets mosquito larvae control, including bio-chemical control, is recommended in the BMPs. (Tom Hruby, Ecology Wetland Specialist, Personal Communication, 1/16/04)

Methoprene

Comment 2. This comment addresses the issue of restricting the use of methoprene in areas known to provide habitat for state threatened and endangered species during the mosquito spray season. There were divergent views on the proposed restrictions. One view suggests the restrictions are unnecessary, the other suggests precaution due to unknowns. Let it be noted that the WDFW restricted areas are the only conditions for methoprene in the Permit that are more stringent than the application conditions set by FIFRA labels.

> **View 1.** The 2001 USEPA document together with the 2003 USEPA research and the World Health Organization/FAO review state that methoprene will have minimal adverse effects on non-target species. The Fish and Wildlife letter pretty dramatically overstates the risks associated with this product. Decisions should be made on sound science. Methoprene should be allowed in areas identified by WDFW to minimize the potential increase use of adulticides, which will likely result due to insufficient control of third and fourth instar larvae using *Bacillus* products only. (1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13, 15, 18, 19, 41)

> **View 2.** We [WDFW] appreciate Mr. VanGundy's [VanGundy represents Wellmark International, a manufacturer of methoprene products] explanation regarding the contents of the EPA RED documents. We notice that EPA does denote a level of amphibian toxicity from methoprene ("minimally toxic to amphibians"). In our October 13 letter, we state that research on methoprene and frog deformities is inconclusive. There are studies that have found developmental effects to amphibians when methoprene was applied at mosquito control treatment levels, and there are studies that have not observed this. We do not think it would be productive to engage in debate/rebuttal over all research on this matter. Because the body of research on this topic is not definitive we have chosen to use the precautionary principal when conserving state and endangered species. We did not feel that there was sufficient information to recommend that methoprene products be restricted other than in very localized areas where we have identified T & E species. Given that we are making recommendations for state threatened and endangered species, in very limited areas, and that other efficacious mosquito control products (*Bacillus*) are available, we continue to support our original recommendation on methoprene restriction. (4, 16)

Response to Comment 2. *Aquatic Mosquito Control Permit No. WAG – 992000, Section S4. Best Management Practices/Integrated Pest Management requires the preparation and implementation of an Integrated Pest Management Plan (IPMP) by the permittee. Among other conditions, the section states, "in developing the IPM plan, the permittee shall consult with local governments and state and federal agencies as needed." The Permit Fact Sheet provides the following rationale for this condition:*

> *…an IPM program considers all available control actions, including no action, and evaluates the interaction among various control practices, cultural practices, weather, and habitat structure. This approach thus uses a combination of resource management techniques to control mosquito populations with decisions based on surveillance. Fish and game specialists and natural resources biologists should be involved in planning control measures whenever delicate ecosystems could be impacted by mosquito control practices (p. 9).*

Ecology took the lead developing an IPM plan to assist local governments and others performing mosquito control operations who were suddenly in the business of mosquito control due to the spread of the West Nile virus. As the permit required, Ecology consulted with the Department of Fish and Wildlife (WDFW) in spring 2003 during this process. WDFW identified wildlife species that it considered most vulnerable to certain mosquito control larvacides, identified the primary areas occupied by these species, and requested that pesticide applications be restricted in these areas. Ecology also invited representatives from the industry to comment on the basis of the WDFW recommendations. An evaluation of the issue yields the following facts:

1. *The criteria WDFW used for denoting species as vulnerable were appropriate. Only those listed as state endangered, threatened, sensitive, or candidate species that inhabited freshwater wetlands during most of the mosquito control treatment period were considered. Five species met the criteria: northern leopard frog (Rana pipiens), Oregon spotted frog (Rana pretiosa), western toad (Bufo boreas), western pond turtle (Clemmys marmorata), and one butterfly, the Yuma skipper (Ochlodes yuma).*
2. *The total area occupied by these species in rivers, lakes, ponds, and wetlands is tiny, comprising of portions of 117 sections (<0.18% of Washington State). Many areas identified for northern leopard frog (36 Sections) and western pond turtle (13 Sections) are owned or managed by WDFW.*
3. *EPA's Methoprene Registration Eligibility Document (RED) is dated March 1991. This document has not been updated. A Fact Sheet for the RED was updated in 2001. The RED document states, "The Agency does have data, however, that show that methoprene is highly acutely toxic to estuarine invertebrates" (p. 12). The Fact Sheet for the RED document updates this assessment and describes the level of amphibian and fish toxicity from methoprene as "minimally toxic" but does not define what that means or explain if that is sufficiently protective for federally and state listed species of concern. The World Health Organization indicates methoprene is slightly toxic to fish but lists no data on amphibians.*
4. *Recent research on methoprene and frog deformities and developmental toxicity is inconclusive. For example, La Clair el al. (1998) found that methoprene breaks down quickly in sunlight and very low concentrations of the byproducts from degradation interfere with normal amphibian development. The La Clair study concluded "the addition of 1µL/L of several of S-methoprene's degradates to the environment of developing [amphibian] embryos resulted in juveniles with deformities similar to*

that found naturally." Ankley et al. (1998) found that UV light caused amphibian limb malformations whereas methoprene did not. The study further reported that concentrations of 500 ppb of methoprene caused mortality in amphibians. Degitz et al. (2003) was unable to reproduce the results of the La Clair study, but did determine that methoprene and its metabolites did not cause any adverse effects at rates < 1.25 ppm. These data are too disparate to be conclusive. Even though risk levels appear to be low, much uncertainty still exists with both the concentrations and the role methoprene and its metabolites play with the normal development of amphibians.

5. *Levels of methoprene that may be found in the environment after mosquito control applications are also variable. Concentrations have ranged from 4 ppb at seven days post treatment from an Altosid 30-day briquette (Ross et al 1994) to 0.01 ppm from sustained-release formulations (Degitz et al. 2003). Henrick, et.al. (2002) found 26 ppb s-methoprene in ponds treated with Altosid Liquid Larvicide (ALL) at day one, and 1 ppb at day seven. However, one of the metabolites, 7-methoxycitronellal acid, was found at 267 ppb at day 1 and 237 ppb at day 7. Notably, these levels do not represent multiple treatments or potential accumulation or any number of other factors, such as shade, wind, water flow, temperature, pH, turbidity, etc. that may affect concentrations of applications to the natural environment.*
6. *Several studies concluded that a dose-exposure connection between frog deformities and methoprene applications for mosquito control is unlikely and that correlations between locations of methoprene applications for mosquito operations and frog deformities have not been found (Henrick, et.al. 2002, Johnson et.al. 2001, Ankley et al. 1998).*
7. *Larvicides containing Bacillus thuringiensis israelensis (Bti) and Bacillus sphaericus (BS) are allowed for use in these areas due to their extreme low toxicity to non-target species.*
8. *The restricted areas identified by WDFW may pose a threat to human health when used as breeding grounds by mosquito vectors due to the narrow window of effectiveness of Bacillus products.*

Ecology proposes to allow the use of methoprene in more than 99% of the state as conditioned by the federal FIFRA label but will continue to restrict the areas of application for methoprene as recommended by WDFW except in the event of a human health threat from mosquito-borne disease as determined by the State and local health departments. Mono-molecular films, oils and organophosphates are also restricted in these areas, but the restriction on the use of methoprene was questioned due to its low toxicity to non-targets and high selectivity for mosquito larvae.

To aid future decisions regarding the use of methoprene Ecology will complete a SEPA checklist evaluation of the use of methoprene for mosquito control operations and initiate a monitoring strategy to document concentration levels of methoprene applications in relation to possible adverse effects to non-target species. Many individuals, including people representing mosquito districts, local governments, Wellmark and WDFW have offered to review and/or assist with the monitoring strategy. We intend on taking advantage of these offers. The objective of the evaluation and monitoring plan will be to provide data on methoprene for decisions relevant to permit renewal by November 2006.

Comment 3. Page 13 of the BMP under permitted pesticides for mosquito control: The chart should be corrected to show specifically listed pests for Altosid products. Under the heading "Target Pests

on Label," the identified species in the chart for Altosid indicates a variety of pests. There are other methoprene labels that reflect these pests but for Altosid, mosquitoes are the only listed species. (10)

***Response to Comment 3**. Agreed, the chart has been edited. However, EPA's 2001 Methoprene R.E.D. Fact Sheet states that methoprene "has activity against a variety of insect species, including horn flies, mosquitoes, beetles, tobacco moths, sciarid fly, fleas (eggs and larvae), fire ants, pharaoh ants, midge flies and Indian meal moths." This information has been noted as a footnote to the chart.*

Comment 4. The statement in Comment 2, that "We do not think it would be productive to engage in debate/rebuttal over all research on this matter [methoprene and amphibians]," is frankly stunning. I do not believe that I have ever seen a government entity express the thought that they do not want to review the scientific facts on a controversial issue. Given that Ecology's proposed alternatives to methoprene are frequently less effective in numerous circumstances, that resistance management through pesticide rotation is a cornerstone of modern IPM, and that USEPA and numerous other independent reviewers have found "minimal toxicity" or equivalent wording, the proposed prohibition should not occur without strong scientific evidence supporting it, and this has not been provided. (2)

***Response to Comment 4.** The comment referred to in the above statement, made by WDFW, was explained in the context: "Because the body of research on this topic is not definitive we have chosen to use the precautionary principal when conserving state and endangered species. We did not feel that there was sufficient information to recommend that methoprene products be restricted other than in very localized areas where we have identified T & E species. " They did review scientific facts, it was the lack of evidence regarding methoprene's toxicity that lead them to recommend the precautionary principle.*

Comment 5. The WSDA would like to inform Ecology that the Centers for Disease Control and Prevention, (CDC), recommends the alternation of biorational larvicides (Bti and Bs) and insect growth regulators (methoprene) annually or at longer intervals to prevent the development of insecticide resistance in vector populations. The WSDA recommends that the restriction of the use of Bti and Bs only in certain areas identified in the BMPs be amended by allowing some use of methoprene in rotation and in combination with the approved biorational larvicides so as to prevent the development of resistance to Bti and Bs. (3)

***Response to Comment 5**. Since the restriction on the use of methoprene applies only in very select sites the rotation process recommended would not be precluded in 99% of the state.*

Further, in discussions with mosquito control operators around the state, we found that resistance to Bacillus products has not been found.

Comment 6. The language allowing local jurisdictions to declare a health threat so they have access to methoprene is very unclear. This BMP gives no guidance as to how local boards of health are to be proactive in protecting the communities or what thresholds should be used to determine the potential

for human health risks. Inconsistent mosquito control thresholds could result in water quality problems and people taking illegal control measures into their own hands. (7, 16, 17)

***Response to Comment 6**. Permit condition S1.4. restricts the use of methoprene in areas designated by Washington State Department of Fish and Wildlife except when a heath threat exists in those areas as determined by the State and local health departments. No health-based thresholds are stated in the BMPs or the permit. The Department of Health requested that health-based determinations be stated in general terms because the process and criteria used by local health jurisdictions to determine health threats is dependent on local conditions such as demographics, population densities and species of mosquitoes, proximity of positive identifications of mosquito-borne disease, tolerances for pesticide applications and tolerances for disease outbreaks. However, the language on page 16 of the BMP under the section, "What Constitutes an Emergency of Health Threat?" has been clarified.*

Comment 7. Page 3, paragraph 3. Regarding the statement in the BMP that methoprene is an endocrine disrupter, this statement is untrue and I would propose that this language be removed from the revised BMP. While endocrine disruption is becoming an area of concern, there are still ongoing discussions surrounding testing methodologies. Currently there is a lack of validated test systems. Methoprene does not disrupt the production of any glandular hormone within insects, other invertebrates, vertebrates or mammals. In insects it merely augments naturally occurring insect juvenile hormone (JH) at times in the insect life cycle where natural production of JH is at a minimum. An example would be during the molt from the last larval instar to the pupa or adult stage. I have included a more detailed commentary as Attachment 1. In mammalian systems, methoprene is broken down and excreted primarily through urine. (10)

***Response to Comment 7.** Ecology agrees, the statement has been removed.*

Comment 8. There has been much discussion of the non-target effects of methoprene. As I outlined in my other correspondence, there exists a wide margin of safety to non-targets when methoprene is used according to label directions. There is no concern for accumulation of methoprene in the environment as it rapidly degrades, further Henrick et al. 2002, report that the degradation products of methoprene rapidly degrade as well, without accumulation. Methoprene can be used with confidence against mosquito larva but also provides for wide safety margins to non-targets. (10)

***Response to Comment 8**. While there is no evidence that the use of methoprene for mosquito control will lead to amphibian malformations or other adverse effects to non-targets, the data are inconclusive. Scant monitoring has been done of methoprene applications for mosquito control in the natural environment. Ecology is initiating a monitoring strategy to document concentration levels of methoprene applications in the environment and will evaluate those levels in relation to possible adverse effects to non-target species.*

Comment 9. Page 18. There are some errors in the chart that need correction. The Altosid Liquid use rate should be changed to 3-4 ounces per acre instead of 2-20 pounds per acre. The 2-20 pound rate is incorrect for this formulation. The rate for Altosid XRG should be changed from 8-10 pounds to 5-20 pounds to reflect the label rate. In the target pest category there are a variety of pests listed for the

Altosid products. While this list is inclusive of several product lines, it does not reflect the fact that the Altosid products are labeled only for mosquitoes. I would suggest that pricing be removed from the chart. Pricing is subject to change by time and location. Since the BMP is a document that will exist for some time, the pricing that is stated now in the BMP may not be indicative of a current price for future referrals to the BMP. (10)

Response to Comment 9. *The errors have been corrected. Prices, based on 2002 levels, will be retained only as a general guide for cost comparisons, one of the factors for consideration in an IPM plan.*

Comment 10. Methoprene's Impacts To Amphibians? -- A few years ago, the U.S. Fish and Wildlife Service (USFWS) imposed a condition for methoprene's use on one of our two National Wildlife Refuges that methoprene not be applied over wetlands where the salinity was less than 5 ppt, done in what appeared (at least to us) to be an overly-zealous application of the precautionary principle, because of the service's supposed concerns about the impacts of methoprene upon the developmental stages of amphibians (which of course are found more typically in freshwater habitats than in salt marshes, hence the Service's 5 ppt demarcation). However, this restriction only lasted for one year in relation to our then questioning the USFWS's scientific foundations about their position -- after further review of the scientific evidence, it then seemingly became apparent to the USFWS that there was no credible scientific evidence to link any amphibian developmental abnormalities or deformities seen in the field with exposures to methoprene associated with operational mosquito control, and this unnecessary restriction was rescinded. As I probably don't have to tell you or others in your state agency (if you're familiar with the scientific literature about these matters), several other much more probable causes of amphibian developmental abnormalities have now been scientifically identified (*e.g.*, parasitic infections, excessive UV light exposure, etc.) and been linked as the primary culprits for what has been observed for amphibian abnormalities, with any lingering connection here to the use of methoprene being an unwarranted, poorly-founded leap that serves little purpose (but wherever such claims still unfairly persist, then this bias certainly hinders the beneficial use of an important, environmentally-compatible mosquito control tool). (11)

Response to Comment 10. *We would be interested in any written assessment made by the USFWS on this matter. Thank you for your comments.*

Comment 11. Methoprene Use In Coastal Wetlands -- As part of our statewide Integrated Pest Management (IPM) approach to mosquito control, we use methoprene (a juvenile growth-hormone mimic) as our frontline operational larvicide for salt marsh mosquito control, in spraying thousands of acres of Delaware's coastal wetlands with Altosid up to several times each summer (with our primarily using the A.L.L. 20% Concentrate formulation), including extensively using Altosid on Delaware's two National Wildlife Refuges. We find that Altosid gives us effective control achieved in practicable manner, and to the best of our knowledge does not have any unacceptable non-target impacts or environmental problems.

Methoprene Use In Freshwater Wetlands -- We also use methoprene for control of freshwater mosquitoes in stormwater management basins and constructed wetlands, often using some type of extended release formulation for this product in these settings, which similar to our salt marsh use also gives us effective control without any unacceptable side effects. (11)

Response to Comment 11. *Thank you for your comments on the use of methoprene. However, lacking any qualification on what is meant by "to the best of our knowledge" or "unacceptable side effects" we cannot make decisions on the use of methoprene based on these testimonials.*

Comment 12. [My] Only comment is on the BMP page eleven last paragraph, with the sentence that begins with "Methoprene can be used on older larval stages and for ...to late to use either Bacillus or ***methoprene*** ..." seems to say methoprene can be used when its too late to use methoprene??????? What gives? (14)

Response to Comment 12*. It was a typo. Thanks for catching it. The text has been corrected to read: Methoprene can be used on older larval stages (i.e., pupa), and for situations where it is too late to use either Bacillus thuringiensis israelensis or Bacillus sphaericus, a monomolecular film might be used.*

Comment 13. Statement in the draft: "Ecology proposes to continue to restrict the areas of application of methoprene." But then ecology goes on to say, "they will initiate a monitoring strategy to document concentration levels and if necessary, levels of toxicity to non-target species." The objective of monitoring will be to provide data on methoprene for permit renewal in 2006. Response: This monitoring, should it take place, SHOULD take place in the areas in question that are healthy frog environments now. Not some place that is already stressed for some other reason. And in monitoring the areas in question there will be records of methoprene application over the past years that will give some basis on where to start. And not take another twenty years in another location establishing a track record. And if monitoring is going to be done then it would seem that applications of methoprene should take place. Otherwise, what is going to be monitored? (15)

Response to Comment 13. *Comment noted. We will take your comments into consideration as we develop the monitoring plan.*

Comment 14. Calling your attention to the California draft fact sheet, written by the California State DOE, page 7, par 4, "USEPA has concluded that, used in mosquito control programs, methoprene does not pose unreasonable risks to wildlife or the environment." Now granted, each state can say and do whatever they want. And it is certain California has endangered species. But decisions being made in California are made on sound, current research. (15)

Response to Comment 14. *Decisions made in California are reviewed for relevancy to our program. Their control operations and monitoring results will be included in our SEPA evaluation.*

Comment 15. It was stated in the [WDFW] comments, "there are studies that have found developmental effects to amphibians when methoprene was applied at mosquito control treatment

levels and there are studies that have not observed this." Response: Those studies that showed negative effects should be produced for review in this decision making process. And the studies must be the most current up to date studies. And not studies that are old and have been disproved. At the meeting in Olympia on 5 March '04, industry presented, once again, the current facts on methoprene. With even newer studies done by OSU. And WSFW said, "we still have questions." When asked what are your questions the reply was, "we don't know." However, at least after three years WSFW and DOE are listening to the mosquito districts when they say, methoprene cannot be found or monitored for; only the effects can be monitored. (15)

Response to Comment 15. *See response to Comment 2. The SEPA evaluation and monitoring plan for methoprene have been proposed to clear up some of these ambiguities regarding the developmental toxicity of methoprene to non-target species.*

Comment 16. The most recent information is from Oregon, where ponds have been treated with methoprene and heavily monitored for the past several years. In over ten prior years of methoprene application and close inspection of populations, there has been no evidence of malformations. A recent discovery of infected snail populations, which harbor the deformity-causing trematodes, was a premonition of a deformity outbreak and further confirms that trematodes are to be strongly linked with these deformities, not methoprene. The newness of this information is encouraging and is a close geographic example of how deformities in the amphibian population are not related to methoprene. This should be taken into consideration as the BMP is revised another time. (19)

Response to Comment 16. *Ecology would be interested in reviewing the Oregon studies. Please forward any contact information you may have.*

Comment 17. If the proposed methoprene restriction is related to an absence of long-term testing and environmental impact studies, Wellmark requests to review the documentation that Washington is using for the long-term studies on other larvicide and adulticides products. (19)

Response to Comment 17*. Please see response to Comment 2.*

Comment 18. As mentioned in the meeting, many mosquito districts are influenced by decisions from other parts of the nation when it comes to restrictions on products. If the best management practices document continues to have restrictive language for methoprene, we will want a complete explanation for the decision so that other states can have a thorough understanding of Washington's position - how it is solely related to Washington State endangered species issues and not for the use of methoprene in general. (19)

Response to Comment 18*. Ecology's restriction of methoprene is solely related to Washington state endangered species issues and not for the use of methoprene in general. General use is not restricted beyond the FIFRA label. Preemptive use of biocides, including methoprene, is recommended in the BMP to minimize mosquito breeding sites and the need to use more toxic insecticides in the event of a disease outbreak. Further,*

Ecology did not assess the harm posed by methoprene to endangered species sufficient to warrant restricted use when a human health threat exists. Also see response to Comment 2.

Comment 19. To date, the comments that we have reviewed and those that have been previously missing are overwhelmingly in methoprene's favor, submitted by professionals who have used the products for many, many years without environmental incident. Why is there no impact, reduction or deletion of the restriction language, or are these comments to be ignored? (19)

***Response to Comment 19**. Our responses largely address those comments that are based in fact or law. The preponderance of users of a pesticide does not constitute its lack of adverse effects because oftentimes the causes of adverse effects and correlations are difficult and costly to determine. Also see response to Comment 2.*

Larvicide Preferences

Comment 20. After reviewing the BMP I would like to state that I believe that many improvements have been made and it is now a more concise and user friendly guide. I commend you for taking out the larvicide hierarchy wording that was present before. I believe that there is still a preference indicated, but an effort has been made to clarify that a particular larvicide will not work best (or at all) in certain situations. (6, 7, 8, 9, 10, 13)

***Response to Comment 20.** We agree. The language has been further clarified. Permit Condition S1.A.4 now reads:*

4. *Authorized pesticides are:*
   - *Bacillus thuringiensis israelensis (Bti)*
   - *Bacillus sphaericus (H-5a5b)*
   - *Methoprene Granular, Liquid, Pellet, or Briquette.**
   - *Monomolecular Surface Films*
   - *Paraffinic white mineral oil. Paraffinic white mineral oil shall not be used in waters of the state unless:*
     a. *The mosquito problem is declared a public health risk; or*
     b. *The other control agents would be or are known to be ineffective at a specific treatment site; and*
     c. *The water body is non-fish-bearing (consult Washington State Fish and Wildlife concerning fish and wildlife).*

** Use of methoprene is not restricted for use beyond the FIFRA label in more than 99% of the State. However, methoprene is restricted in areas designated by Washington State Department of Fish and Wildlife (see Appendix A) except when a health threat exists in those areas as determined by state and local health departments.*

Comment 21. I have a current label of Malathion 8 Spray produced by Wilbur-Ellis Co. with an EPA Reg. # 2935-83-ZA. The label states:

"Mosquito Larvae: Apply 8 fluid ozs. per acre to standing water (intermittently flooded areas, stagnant water, temporary rain pools). Broadcast use only over intermittently flooded areas. Application may not be made around bodies of water where fish or shellfish are grown and/or harvested commercially."

I am not saying that I want to use this all the time. I am not saying that I would use it at all. I did not use it as a larvicide this year, but it is registered and as long as it is, it should be left available to use at least in case of emergency without having to go through all the bureaucracy that can occur. The more products are available the more effective, including cost effective, we will be. (5, 8, 11, 12, 13)

Response to Comment 21. *Section S1, of the permit has been revised to allow the use of larvicides based on effectiveness and situation rather than just toxicity. According to Steve Foss, Pesticide Management section of WSDA, larvicides containing the active ingredients of malathion or temephos are not likely to be needed due to pesticide resistance or in cases of an emergency. However, larvicide products containing temephos are needed in areas with high organic content, such as wet manure fields and lagoons because the other larvicides permitted for use are often ineffective in these areas. In addition, manure fields and lagoons typically do not drain to surface waters. When surface waters are not affected monitoring will not be required. Malathion may be applied under an experimental use permit, so it remains in the tool box.*

Permit Condition S1, proposed modification:

5. *Temephos may not be used in lakes, streams, or the littoral zone of water bodies or on state-listed specie sites listed in Appendix A of the BMPs, (Ecology publication 03-10-023). The use of temephos shall be allowed only in highly-polluted water (i.e. tire piles) or waters with high organic content (i.e. manure holding ponds and pastures with no surface water runoff), or under either of the two following conditions:*
   a. *As a result of consultation between the Departments of Agriculture and of Ecology in response to the development of pesticide resistance or ineffectiveness within a population of mosquitoes. When temephos is applied to areas draining to surface waters monitoring of persistence and residues are a condition of the approval. Temephos must be rotated with one or more of the approved alternatives with a different mode of action to minimize the development of resistance.*
   b. *As a result of consultation between the Department of Health and Department of Ecology in response to the development of a human health emergency as determined by the Washington State Department of Health.*
6. *Other pesticides may be applied in the context of a research and development effort under the jurisdiction of the Washington State Department of Agriculture through the issuance of a Washington State Experimental Use Permit.*

Comment 22. In the Permit, Condition S4. A. 2. The phase, "in the order of preference in which they should be considered" should be changed to, "may be considered." (7, 8)

***Response to Comment* 22.** *Agreed. The Permit now states:*

> ***S4.A. 2.*** *The IPMP shall consider the approved list of pesticide-based controls found in Section S1.*

Comment 23. Page 9 of the Permit, Condition S4. A. 1. contains the phrase, "except in response to documented" should be replaced with "to minimize the". Resistance is very difficult to document. Resistance management is part of an effective IPM plan. (7, 8)

***Response to Comment* 23**. *Ecology met with WSDA over this language because resistance is difficult to document. The Permit language now states:*

> ***S4.A.1.*** *In the IPMP, pesticides that are effective in controlling the mosquito population and have the least adverse impacts to nontarget species shall be used except in response to documented development of resistance or in cases of ineffectiveness or in a declared public health emergency.*

Bio-controls

Comment 24. Use of Appropriate Bio-controls (p. 2 of the BMP) states, "Stock water gardens *that have no surface inlet or outlet* with mosquito-eating fish (*i.e.,* goldfish, mud minnow, stickleback, and perch). Tadpoles, dragonfly larvae, diving beetles, back swimmers, and front swimmers also prey on mosquito larvae. For more information, see http://www.wa.gov/wdfw/factshts/westnilevirus.htm"

*This website has changed: http://www.wdfw.wa.gov/factshts/westnilevirus.htm, is the current site address. However, at this website, it only mentions birds and bats as natural predators for mosquitoes. I do not question the idea that the animals that you listed will feed upon mosquitoes (larvae or adult), but I think it is extremely misleading to imply that efficient control can be achieved with organisms like birds, bats, tadpoles, diving beetles, etc. More importantly, the website you are asking people to go does not appear to back up the limited claim for bird and bat control with any scientific evidence. (6)

***Response to Comment* 24.** *Thank you for the updated link. Use of bio-controls may or may not yield sufficient control, efficacy was not meant to be implied. Of concern is that goldfish and other predacious bio-controls may escape into natural water bodies where they could become invasive or problematic.*

Comment 25. In mosquito control plans put together by several other states, pesticides are listed and identified as biopesticides or traditional chemical pesticides. The benefits and limitations of each product are described. The applicator is free to choose the best fit for the situation. The EPA classifies *Bti, Bacillus sphaericus*, and methoprene all as biopesticides, thus putting them in the same category. Washington is the only state that separates out methoprene. When deciding which control agent to use, it is important to consider efficacy. "Methoprene has consistently proved to be one of

the most effective insect growth regulators against mosquitoes and is usually more efficacious than biological control agents" (Glare, 1999). The presence of pollutants, salinity, organic and inorganic particles can all reduce the efficacy of Bti.

According to the Center for Disease Control (CDC), two factors that contribute to the spread of West Nile Virus (WNV) include abundance of vectoring species of mosquitoes and wide spread irrigation. Washington has both. The proposed BMPs do not follow CDC guidelines for mosquito control. The CDC recommends the use of larvicides in targeted locations in risk category one. The proposed BMPs wait until risk category four to recommend larvicide use. By this stage, the CDC has already recommended increased larval control and intensifying adult mosquito control. (7, 3, 6, 8, 11, 12, 13, 19)

Response to Comment 25. *We agree that bio-chemicals like the bacteria Bti and the growth hormone methoprene should be included in this category. The following language has been added to this section (p. 3) of the BMP to encourage preemptive chemical bio-controls where predators alone may not be effective.*

Minimization Actions

Use Appropriate Bio-Controls

- *Selective bio-pesticides such as Bacillus thuringiensis israelensis (Bti), B. sphaericus or methoprene are very effective preemptive controls when applied in the spring to specific sources identified by surveys. Amplifying and bridge vector species should be targeted (also see p. 11.).*

Comment 26. Page 11: The title, "Chemical Controls" is misleading. Bti, Bacillus sphaericus, and methoprene are all classified by the EPA as biopesticides. The title should reflect that this section includes biopesticides, oils and traditional pesticides. (7, 8)

Response to Comment 26*. Agreed, the title has been changed to, "Microbial, Biochemical and Conventional Chemical Controls."*

Comment 27. Preemptive treatments (larviciding known breeding sites early in the season) may reduce the need for adulticiding later. (1, 7)

Response to Comment 27. *Agreed, preemptive larviciding with bio-chemicals has been added as an option under the breeding site minimization actions.*

Adulticiding

Comment 28. I believe that the section giving a BMP for adulticiding is misplaced. I am unclear as to your implication of adulticiding applications needing a NPDES permit (unless you mean when directly affecting water). Also, I feel that if you admit you don't have jurisdiction in terrestrial

applications of adulticides, then indicated the Best Management Practices for them seems inappropriate. This should be left up to the organization that has direct jurisdiction.

In addition, Ecology's BMP states that there should not be any adulticiding done unless there is a disease present. (5, 6, 9)

Response to Comment 28. *A large majority of workshop attendees (October 14 & 15 in Moses Lake and October 21 in Lacey) wanted the adulticiding section left intact because it is an integral component of their integrated pest management approach to mosquito control. Treatment triggers are left to the mosquito control operator or the organizations they work for to determine. The BMP states:*

> *"Select triggers for the use of adulticide products: Some mosquito control districts recommend using light traps to monitor for mosquitoes. For example, Adams County MD recommends that counts of 8 to 12 mosquitoes caught in 12 hours or a 3 adult mosquito landing count per minute in a residential area triggers the need to adulticide (Thomas Haworth, personal communication, November 7, 2003). Some applicators recommend adulticiding residential areas and upland areas where mosquitoes are migrating only when there is evidence of mosquito-borne epizootic activity at a level suggesting high risk of human infection. The following are examples of this type of evidence: high dead bird densities; high mosquito infection rates; multiple positive mosquito species including bridge vectors; horse or mammal cases indicating escalating epizootic transmission, including bridge vectors, horse or mammal cases, or a human case with evidence of epizootic activity (p. 21)."*

In some instances, adulticiding can reduce or eliminate the need to heavily apply larvicides, can be used effectively with less environmental impact to non-targets, and can be cost-effective. So for this best practices plan, some information on commonly used products and methods are appropriately included. However, since there have been objections to the inclusion of this section we will more clearly identify Ecology's regulatory jurisdiction in those sections. To be sure, Ecology has no intention of over-stepping its regulatory bounds.

Comment 29. Page 13 of the BMP states, "Terrestrially applied insecticides are NOT regulated under federal or state water pollution control laws and are not subject to NPDES permit conditions or requirements. However, in Washington State *applications of insecticides used for adult mosquito control, even if they are labeled for use over water, i.e., streams, wetlands, rivers, lakes, ditches, etc, must be permitted under a Clean Water Act (NPDES) permit."* *Please clarify; I am assuming that the preceding sentence is referring to when adulticides are used on, in or directly above water. Is this the intent of your sentence or are you stating the regardless of use, an adulticide must have a NPDES permit? If the latter is true this seems to be in direct conflict with the first sentence of section 7. If the former is true then this should be made clear in the BMP. (6)

Response to Comment 29*. The only time adulticide applications would have to be permitted is when they are applied, directly or indirectly, to waters of the state. Ecology's Water Quality Program does not permit the application of pesticides that are applied to terrestrial sites. However, the italicized language has been removed because it was confusing and most likely not needed.*

Comment 30. BMP minimum response does not consider DOH and or CDC guidelines, which consider targeted adult mosquito control by stating, "…adulticiding based on surveillance is an extremely important part of any integrated mosquito management program. (11)

Response to Comment 30. *See Response to Comment 5 and 9. Also, the section that discusses adulticiding describes the various triggers that may be appropriate.*

Dipping Criteria

Comment 31. Could you clarify the dipping criteria for larviciding storm water ponds? The 2003 permit said larvicides could be applied if greater than 0.3 larvae/pupae per dip are found. The 2004 BMPs says 1 larva per 3 dips is the larviciding threshold. The 2004 permit says that greater than 1 larva per 3 dips is the larviciding threshold. With last year's criteria 1 larvae per 3 dips meant we could larvicide. Do we now need 2 or more larvae per 4 dips to larvicide? (22)

Response to Comment 31. *Only 1 larva per 3 dips is needed.*

Comment 32. Could we state in the permit that entities that did control the year before based on their surveillance don't necessarily have to wait for mosquitoes to appear again the following season before using control measures in that water body. This question came up last year from King County, who identified their water bodies that needed control and wanted to continue that control without having to do the surveillance all over again. I'm getting questions such as "We found mosquito larvae last year in this pond, can we apply the mosquito dunks as a preventative measure this year without doing the dipping all over? Does the permit allow this?" (20)

Response to Comment 32. *The permit requires mosquito dunks prior to treatment unless the site is inaccessible (see response to comment 33 below). Mosquito breeding sites may change and there is no need to use larvicides if no larvae are present.*

Comment 33. Page C-5 - Other references use 1 per 3 dips rather than 0.3 per dip. (3, 13)

Response to 33. *Agreed. Section S4.B of the permit now states:*

> *"Pesticide applications shall not commence unless surveillance of a potential application site indicates a larva/pupa count of greater than 1 per 3 dips, or unless dead birds, infected horses, or adult mosquito surveys indicate the presence of vector mosquitoes when larvae counts cannot be made due to their inaccessibility. In these cases larviciding may be desirable or even necessary without the larvae dips."*

Miscellaneous Clarifications

Comment 34. The following clarifications are suggested:

Page 1 - Add - Applications of pesticides are also subject to the Washington Pesticide Control Act (15.58 RCW), the Washington Pesticide Application Act (17.21 RCW), the General Pesticide Rules (WAC 16-228), the Worker Protection Standard (WAC 16-233), a number of pesticide and/or county specific regulations.

Page 3 - The heading "Eliminate Mosquito Feeding Sites" does not correspond to bullets beneath the heading. Suggest different heading such as "Personal Protective Measures"

Page 4 - Clarify that the use of larvicides is one of the Minimum BMP Responses to Minimize Mosquito Breeding and use of adulticides.

Page 5 - Amend Risk Assessment: Probability of outbreak in humans: Remote to low; areas with limited or sporadic WNV epizootic activity in birds and/or mosquitoes.

Page 10. IV. Mosquito Control Treatments
Use larvicides at specific locations when WNV epizootic activity is found in birds and/or mosquitoes.

Page 11 - Amend heading to Microbial, Biochemical and Conventional Chemical Controls.
Bacillus thuringiensis israelensis (Bti) and *Bacillus sphaericus* (H-5a5b) are microbial pesticides.
Methoprene is a biochemical pesticide.
Monomolecular surface films, paraffinic white mineral oil, and temephos are conventional chemical pesticides.

Page 12 - Amend web page reference to guide of larvicide products.
For a guide to larvicides see the WSDA website:
http://www.kellysolutions.com/WA/showproductsbypest2.asp?Pest_ID=IOAMAAC04.

Page 13 - Clarify insecticides listed in table 3 are for larvae control and not adulticides. (3, 13)

Response to Comment 34: *All the comments were accepted and changes made to the BMP document except the WSDA web site address. The WSDA web site was not included because larvicides not permitted for use under this permit may be listed there and it would be confusing to list products not permitted for use.*

Comment 35. Page 12 of the BMP states, "Fish and game specialists and natural resources biologists (WDFW) must be notified of planned control measures whenever delicate ecosystems could be harmed by mosquito control practices…. Could you please clarify how to determine a "delicate ecosystem?" Is this a legal description? Is this only WDFW land? Clarification would be helpful. (6)

Response to Comment 35. *"Delicate ecosystems" are those that can only survive under a narrow range of environmental conditions including light, salinity, temperature, water quality, and nutrients, and are extremely vulnerable to anthropogenic activities. An airplane flying over nesting grounds demonstrates this sensitivity. The phrase was not used as legal terminology, but as plain English.*

Comment 36. The fact that it takes 38 days to obtain a license and permit to undertake mosquito control activities would likely inhibit a community to address an emergency health issue… (11)

Response to Comment 36. *The vast majority of permitted entities in Washington come under the Department of Health's coverage by contracting with them. It takes about a seven-day turn around to do that, largely because of mailing time constrains. It's conceivable to have the turnaround time reduced to a day or two in a real emergency.*

Comment 37. Education of the public in the areas of mosquito habitat reduction and personal protection in and of itself is not protecting the public from disease as is implied in the draft document. (11)

Response to Comment 37. *Personal protection is the best precaution anyone can take to ensure minimal exposure to mosquito borne diseases. If a person tries to kill every mosquito in a two-mile square area they will probably not succeed and when they leave that area they are exposed to increased risk again. The best insurance anyone has against mosquito borne disease is to eliminate the chance of exposure in their direct personal space. This is why Appendix B, Insect Repellent Use and Safety from the Center for Disease Control has been added to the document. It is an excellent informational source.*

Comment 38. An important component of the CDC guidelines is to include monitoring for the disease as well as monitoring for mosquito populations. (11)

Response to Comment 38. *The Washington State Department of Health is the lead on monitoring for the disease. Section II of the BMP directs mosquito control agents to their local health departments for questions and issues related to monitoring for the disease.*

Comment 39. What is going to constitute monitoring? Record keeping or actual testing? Please clarify. (5)

Response to Comment 39. *When the permit was issued, monitoring was intended to examine persistence of the insecticides used in Washington State. Since persistence data for the larvicides allowed for use already exists, possible adverse affects to non-target organisms, rather than persistence, will be monitored. Additionally, the arrival of the West Nile virus in Washington State, has resulted in many local governments and others new to mosquito control practices applying larvicides during the spring and summer months. These new control operations will result in a sharp increase in the amount of larvicide being applied to waters. For these reasons, the monitoring requirement will be modified to only require reporting the type, location, and*

quantities of larvicides used. Ecology will use this information to prepare a plan to monitor for possible adverse affects in areas targeted by the reporting results.

Comment 40. We treat hundreds if not thousands of small ponds through out the season, many of which are less than one acre. If we report those small ponds as <1 acre our rate per acre will all off. My district tries to record each treatment whether 10 acres or .03 acre. (5)

***Response to Comment 40**. Reporting in tenths or hundredths of an acre is more accurate and can be done on the current reporting form. We allow permittees to also 'clump' the acreage they treat in an area so if they treat ten small ponds that are .10 acre each, they can report it as one acre. This works so long as the ponds all drain to the same receiving water.*

Comment 41. Comment to draft: By adding the WSDA RCWs and WACs it would seem that now mosquito control operations are under FIFRA and federal label requirements and NOT second level government rule making. There are so many levels of government that ALL requirements will be difficult for the home owner and layperson to sort out. (15)

***Response to Comment 41.** Ecology must be responsive to Court decisions. However, we agree and have petitioned EPA several times to consider streamlining these requirements for the benefit of operators/applicators.*

Comment 42. How will the comments be handled in this process? It seems they are as much questions as comments. Because all that happens in this process is a response is given to comments with no action taken. (15)

***Response to Comment 42.** The comments are reviewed for basis in fact or law. Where inaccuracies or deficiencies are found, they are corrected.*

Comment 43. This is the second modification in less than one year on the permit, how often will changes be made in the future? (15)

***Response to Comment 43.** This is the last modification that will be made prior to permit renewal.*

Comment 44. I suggest adding "ecologically sensitive areas" to demarcated no-spray zones on maps (p. 11 of the BMP). (16)

Response to Comment 44. Agreed. The language has been added to the section:

> "Demarcate no-spray zones on maps. This may include areas such as schools, hospitals, fish farms, wildlife refuges, ecologically sensitive areas, the homes of individuals who are on chemically sensitive registers, and crops grown under a certified organic program."

Comment 45. C1, Number 3, may cover this, but it would be nice to have this language in more detail somewhere. Could we put what water bodies should have permit coverage? The "waters of the state" catchall works to a certain point, but there seems to be confusion over the water bodies (*i.e.* storm drains with an outlet) that could reach "waters of the state." I have instructed folks that if their water body has the potential to reach waters of the state, they need permit coverage. If "waters of the state" includes water bodies that have a potential to reach waters of the state, we should try to make this very clear. I'm still obviously a little confused... (20)

Response to Comment 45. *The Department of Ecology's Aquatic Mosquito Control permit covers mosquito control activities that discharge insecticides directly into surface waters of the state of Washington. All who conduct mosquito control activities in water for communities, districts and private landowners are required to obtain coverage. "Waters of the state" includes water bodies that have a potential to reach waters of the state.*

References cited:

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Henrick, C.A., J.K. Ko, J. Burleson, G. Lindahl. D. VanGundy and J. Edge. 2002. Investigation of the relationship between s-methoprene and deformities in anurans. J. of Am. Mosq. Control Assoc. 18(3):214-221.

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